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MONTANA OUTDOORS

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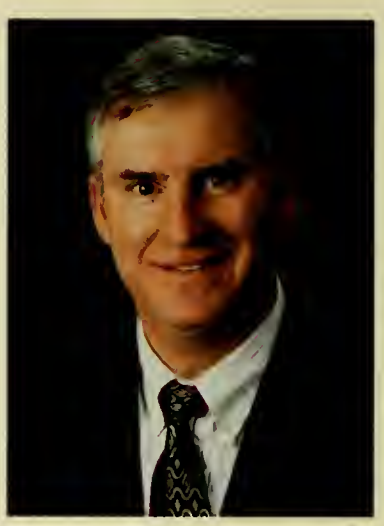
Our Point of View



Sportsmen's dollars generated from license fees and excise taxes on sporting goods are the primary sources of funding for most fish and wildlife research efforts. Read on to learn more about how your dollars are being utilized to better understand and manage Montana's fish and game populations.

If you have been a part of Montana's outdoor scene for any length of time, you know that fish and wildlife populations vary over time in numbers, age classes, and locations. Many factors contribute to these variations—some predictable, others without notice and for no readily apparent reasons.

One of Montana Fish, Wildlife & Parks' primary objectives is to retain healthy fish and wildlife populations over the long term. In order to meet this objective, fish and wildlife managers need to understand species population dynamics and how various natural and man-induced factors influence those dynamics.

This issue of *Montana Outdoors* provides insights into how FWP has conducted research on two species of wildlife: mule deer and bighorn sheep. Mule deer are found virtually throughout Montana and are the most common big game animals pursued by hunters (see page 18). Just a few short years ago, mule deer numbers had declined significantly, leading to more restrictive seasons across the state. Last year conditions were better, with hunters bagging 56,155 mule deer. Recent population surveys indicate that numbers are higher this year than last, signaling another good year for mule deer hunters.

Rocky Mountain bighorn sheep are one of the most highly sought after trophy animals in North America. There were almost no bighorn sheep surviving in Montana in the early 1900s—the native populations had been badly depleted by over-hunting, habitat loss, and competition with domestic livestock. Today, Montana has bighorn sheep populations located in suitable habitats throughout the state, largely the result of transplants from one area to another. Although these transplants have been largely successful, bighorn sheep die-offs have occurred and will likely continue to occur in the future (see page 9).

This year 14,919 hunters (11,692 residents and 3,227 nonresidents) applied for 300 special permits issued in Montana for bighorn sheep. In addition, Montana auctions one bighorn sheep permit annually to the highest bidder. This auction has generated as much as $300,000 in a single year, with the money raised going to bighorn research, management, and habitat development.

Research is critical in helping biologists understand how wildlife populations function and in maintaining healthy fish and game populations. This issue of *Montana Outdoors* provides us the opportunity to share with you some of the knowledge gained in recent years. Without the interest and willingness on the part of sportsmen and women to fund this type of research, the hunting and fishing opportunities we enjoy today would not be available. Thank you for your ongoing contribution to these efforts!

M. Jeff Hagener

M. Jeff Hagener
Director, Montana Fish, Wildlife & Parks

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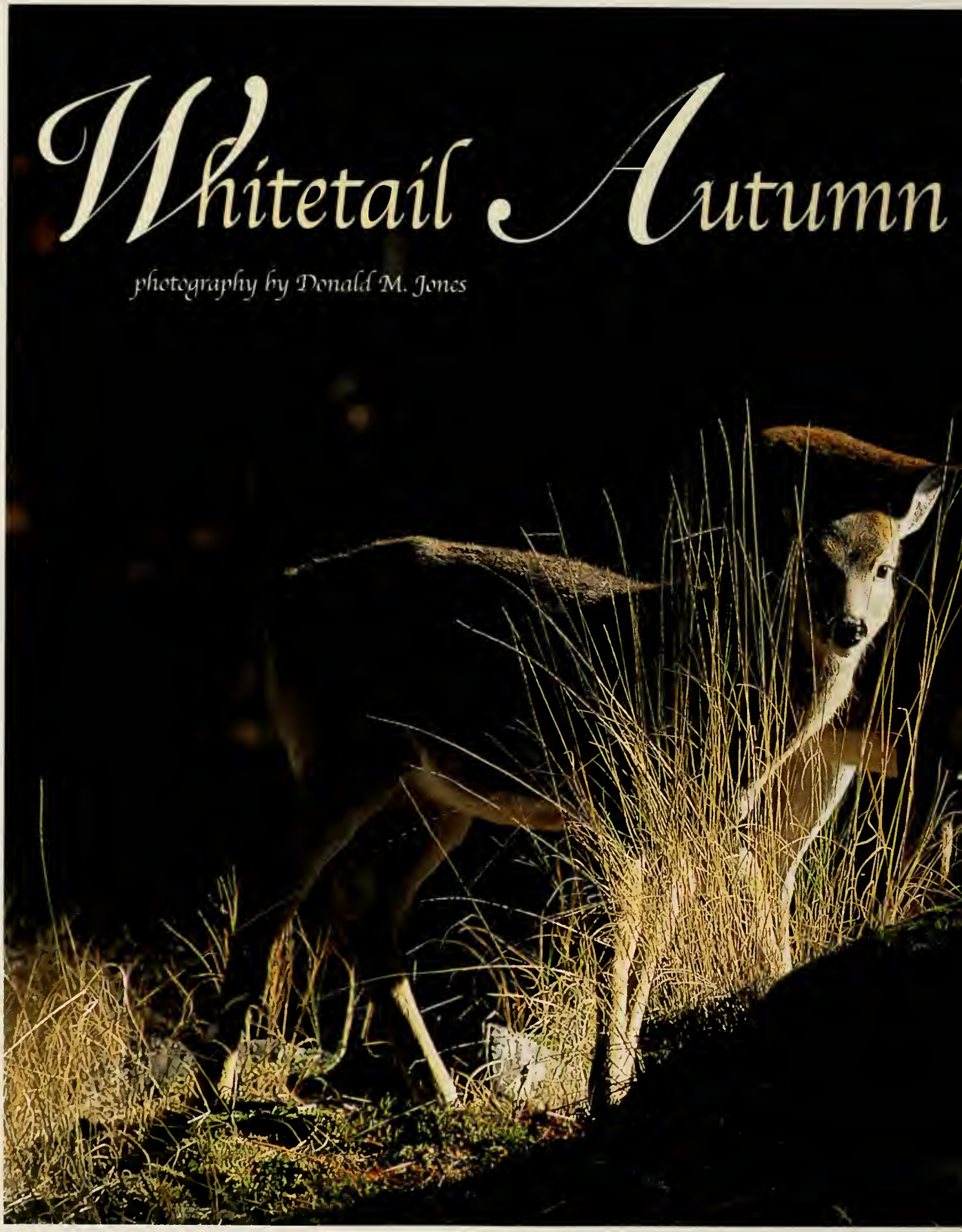
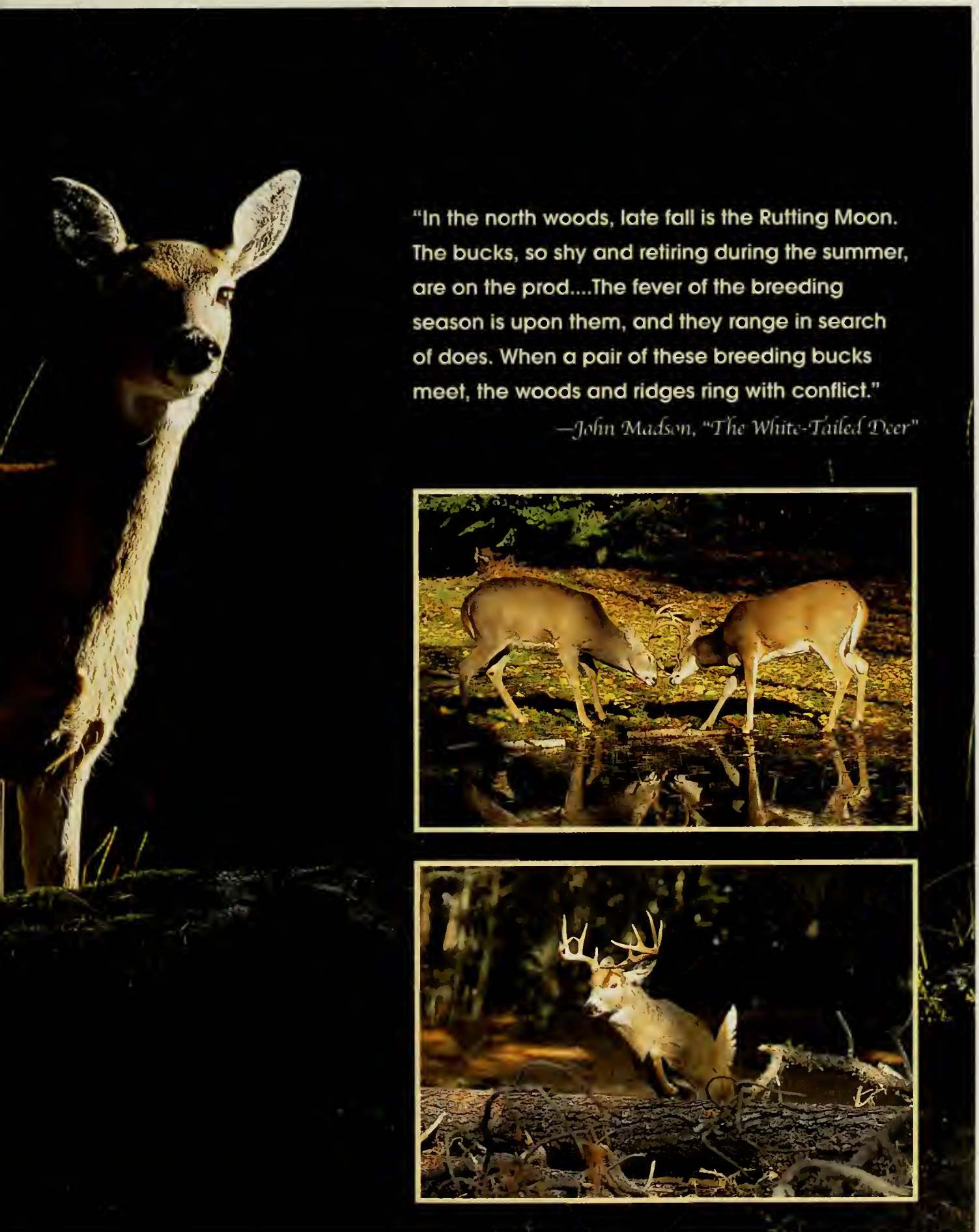
A Rocky Mountain bighorn ram strikes a regal pose. *Photo by John R. Ford.*

Whitetail Autumn

photography by Donald M. Jones





"In the north woods, late fall is the Rutting Moon. The bucks, so shy and retiring during the summer, are on the prod....The fever of the breeding season is upon them, and they range in search of does. When a pair of these breeding bucks meet, the woods and ridges ring with conflict."

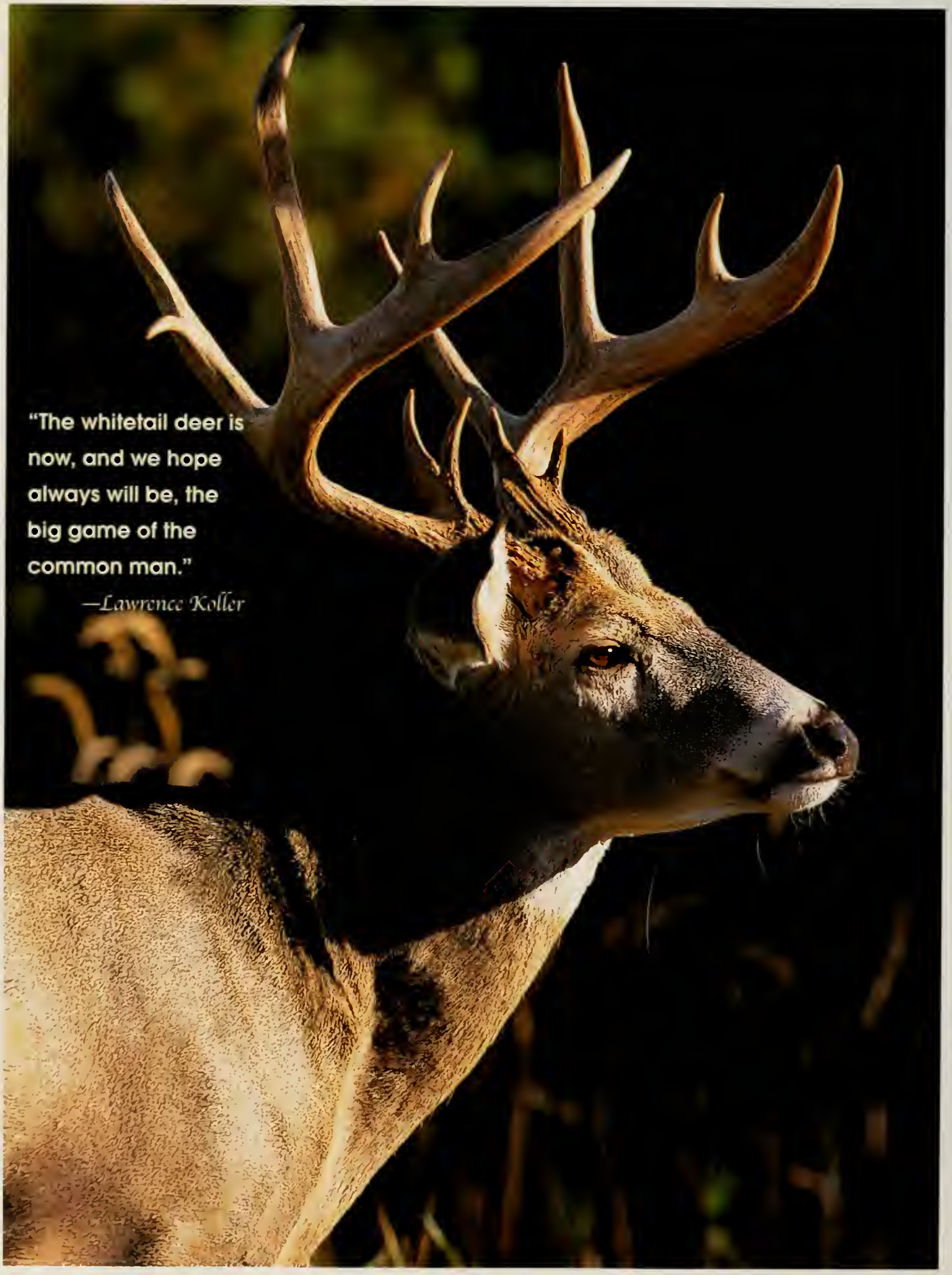
—John Madson, "The White-Tailed Deer"

"Whitetails are nature's finest escape artists. Each one is Houdini on the hoof....If a November morning dawns to fresh snow, I try to beg off on my responsibilities and hunt....Whitetails go with snow like salsa goes on tacos or beer goes with pizza."

—Ben Long, "Home Range"

"The secret of the whitetail's success is simply his success at keeping secret. Given an option, he'll always play it sly."

—*John Madson, "The Secret Life of the Cottontail Deer"*


"The whitetail deer is now, and we hope always will be, the big game of the common man."
—Lawrence Koller

Bighorns in the Big Belts

by Terry Enk and Harold Picton

We stood back and opened the door to the horse trailer, expecting the 15 bighorn sheep inside to bolt for freedom. Yet, after about 20 seconds, none of the sheep had come out. I peeked around the corner to see them huddled nervously in the far corner.

I could understand how they were feeling. In the past eight hours, they had

RODNEY SCHLECHT

TERRY ENK

Bighorns on the Beartooth WMA inhabit low-elevation winter range, like this rocky ridge above Holter Lake, throughout the year.

been captured with a netgun, delivered by helicopter to a base station for a battery of tests, fitted with radio-collars and ear tags, and loaded into the horse trailer. Then they had been hauled from their home near Rock Creek to the site where we now patiently waited—the Beartooth Wildlife Management Area (WMA) at the north end of the Big Belt Mountains (see map on page 13).

Eventually, Montana Fish, Wildlife & Parks (FWP) biologist Jim Williams and I entered the trailer, grabbed a 3-year-old ram, and dragged him out. As he ran up the hill, the other sheep realized the opportunity to escape and followed. While the other people assisting in the transplant let out a sigh of relief and exchanged congratulations on a successful day, my job had just begun.

Over the next three years, I would follow the lives of these transplants as well as the resident sheep on the Beartooth WMA as part of my doctoral program at Montana State University. This research project, funded by the university and FWP's bighorn sheep license auction fund, sought to improve our understanding of this bighorn sheep population and to determine the effectiveness of FWP's augmentation program.

While the Big Belts may not seem like ideal sheep country, the cliffs along the Missouri River represent historical habitat for the species. The journals of Lewis and Clark provided the first written accounts of bighorn sheep in the area. Passing through the Gates of the Mountains area in 1804, they noted the "bighorned animals that bound from cliff to cliff."

Historic accounts provide no information on the size of the sheep population in this area, but we do know that it was extirpated by the late 1930s. In his book *Building the Herd*, local rancher Bryan Hilger recalled that bighorn sheep were targeted by market hunters who supplied food to the miners in Helena. Hilger suggests the demise of this sheep population was due to a combination of over-hunting and disease.

In the 1950s and 1960s, the U.S. Forest Service and Montana Fish and Game Department tried several times to reestablish a bighorn sheep population in the area, but these efforts failed to create a new herd. Then in the early 1970s, the transplant of 113 bighorn sheep to the Gates of the Mountains area formed the beginning of a viable population. Subsequent FWP censuses indicated that not only was the herd growing rapidly, approaching 300 individuals by 1982, but that it had expanded onto the adjacent Beartooth WMA. These sheep had also established seasonal migrations between low-elevation winter ranges along the Missouri River and high-elevation summer ranges to the south and east.

Just when things were looking extremely promising for this new sheep population, disaster struck. In the fall of 1983, FWP biologists noted a decrease in sheep numbers and field investigations confirmed the worst possible scenario—the herd was experiencing a disease die-off. The die-off continued through the summer of 1984, and in October of that year biologists could

only locate 51 survivors. Necropsies of two dead rams at the FWP lab in Bozeman indicated that both had died from pneumonia.

A distinguishing feature of Rocky Mountain bighorn sheep is their extreme susceptibility to a variety of diseases that cause pneumonia and ultimately death. Large-scale die-offs, which can result in more than 70 percent mortality in a population, are fairly common among bighorn sheep herds throughout the western United States. Susceptibility to disease greatly complicates bighorn sheep management and, despite considerable research, the how's, why's, where's, and when's of die-offs remain largely unknown. Studies have shown that residual diseases can adversely affect sheep populations long after the initial die-off. In recent years, several herds in Montana have experienced die-offs, including those in the Tendoy, Highland-Pioneer, and Madison ranges. These herds have not been able to recover to previous densities.

By 1994, a decade after the die-off at the Beartooth WMA, the bighorn sheep population had stabilized at about 50 individuals. Although no large-scale mortality occurred during this period, the fact that a lamb died of pneumonia in 1991 suggests that disease continued to affect the population. FWP managers, concerned over the herd's fate, decided to take two actions. The first was to augment the herd by capturing sheep from other Montana populations and relocating them to the Beartooth. Theoretically, augmentation stimulates population growth by increasing the number of mature ewes. Second, they initiated my study to investigate sheep population dynamics, including distribution and range use, annual reproductive success and lamb survival, and causes of adult mortality. Because of heightened interest in mountain lions on the WMA and their effect on prey species, the study was designed to determine the impact of mountain lions on bighorn sheep. We also monitored transplanted sheep to determine their fates and their reproductive contribution to the Beartooth bighorn population.

MOUNTAIN LION PHOTOGRAPHED IN CAPTIVITY/PATRICK TOALSON/BIGSKYIMAGES.COM

ROONEY SCHLECHT

Mountain lions on the Beartooth prey primarily on deer, although they occasionally kill bighorn sheep. A 3-year study showed that predation has only a moderate influence on the sheep population.

During my three-year study, I lived on the Beartooth WMA and discovered many interesting things about this bighorn sheep population. I learned that the herd did not migrate seasonally as it had in the 1970s, instead utilizing low-elevation winter range throughout the year. Bighorn sheep are highly traditional, and seasonal migration routes are passed from generation to generation. It appears that knowledge of the migration routes on the Beartooth was lost in the 1984 dieoff.

Migration to higher elevation summer ranges is important as it allows access to green, nutritious forage during periods when plants at lower elevations have dried out and lost most of their nutritional value. The loss of summer

migrations adversely influenced the nutritional status of the sheep herd, a conclusion supported by fecal analyses indicating that forages on the Beartooth WMA were at or below maintenance nutritional values (the level necessary for sheep to maintain body condition) from September through April of each year of the study.

Sheep reproduction rates on the WMA were relatively low. Less than 40 percent of the mature ewes produced lambs in any given year, compared with up to 85 percent in healthy bighorn populations. As a result, total annual lamb production varied between 7 and 11 lambs. Lamb survival rates were moderate, with an average of 47 percent of lambs surviving to 1 year of age. However, moderate survival in conjunction with poor lamb production resulted in annual recruitment of only 4 to 6 lambs during this study.

In semiarid habitats like the lower elevations of the Beartooth WMA, summer rains largely determine how long native forages remain green and nutritious. For this nonmigratory bighorn sheep population, summer precipitation directly influenced the physiological status of ewes and lambs. Lamb production during the 3-year study was positively correlated with rains the previous summer (more precipitation = more lambs produced). The smallest lamb crop observed (1997) followed drought conditions during the summer of 1996. Interestingly, Scott Blackman at the adjacent Sterling Ranch noted a significant decline in domestic lamb production as a result of this drought. Drought conditions appeared to adversely influence forage quality and nutrition of ewes, leaving them unable to successfully conceive and produce lambs the following spring.

Lamb survival during the 14 years following the dieoff was correlated with same-year summer climate (more precipitation and lower temperatures = better lamb survival). Again, summer climate influenced forage quality; during warm, dry summers lambs were unable to obtain adequate nutrition. Throughout the study, the majority of lamb mortality occurred between July 15 and September 15—the period when lambs are being weaned onto native forages and losing the immunity they received from their mothers at birth.

Over-winter mortality of lambs was relatively low, with 91 percent of the lambs alive on September 15 surviving to 1 year of age. While there were a few instances of lamb predation, dis-

CRAIG & LIZ LARCOM

RON BOGGS

Lamb mortality on the Beartooth WMA is highest during hot, dry summers, when scarcity of high-quality forage leaves lambs more susceptible to disease.

ease was the primary cause of lamb mortality. We observed symptoms of respiratory disease among lambs and ewes during the drought, a period that also coincided with low lamb survival. Disease was the primary cause of lamb mortality during this period, as lambs were weaned earlier onto poor-quality forage and had lowered resistance.

Recent studies in Canada and California have found that mountain lions can significantly influence bighorn populations when alternative prey such as deer and elk are scarce. To determine the magnitude of sheep predation on the Beartooth WMA, we radio-collared eight mountain lions that occupied bighorn sheep range and tracked them to learn more about their distribution, habitat use, and diet. We found that these mountain lions followed seasonal migrations of elk and deer, moving between low-elevation winter ranges on the WMA to higher-elevation summer ranges.

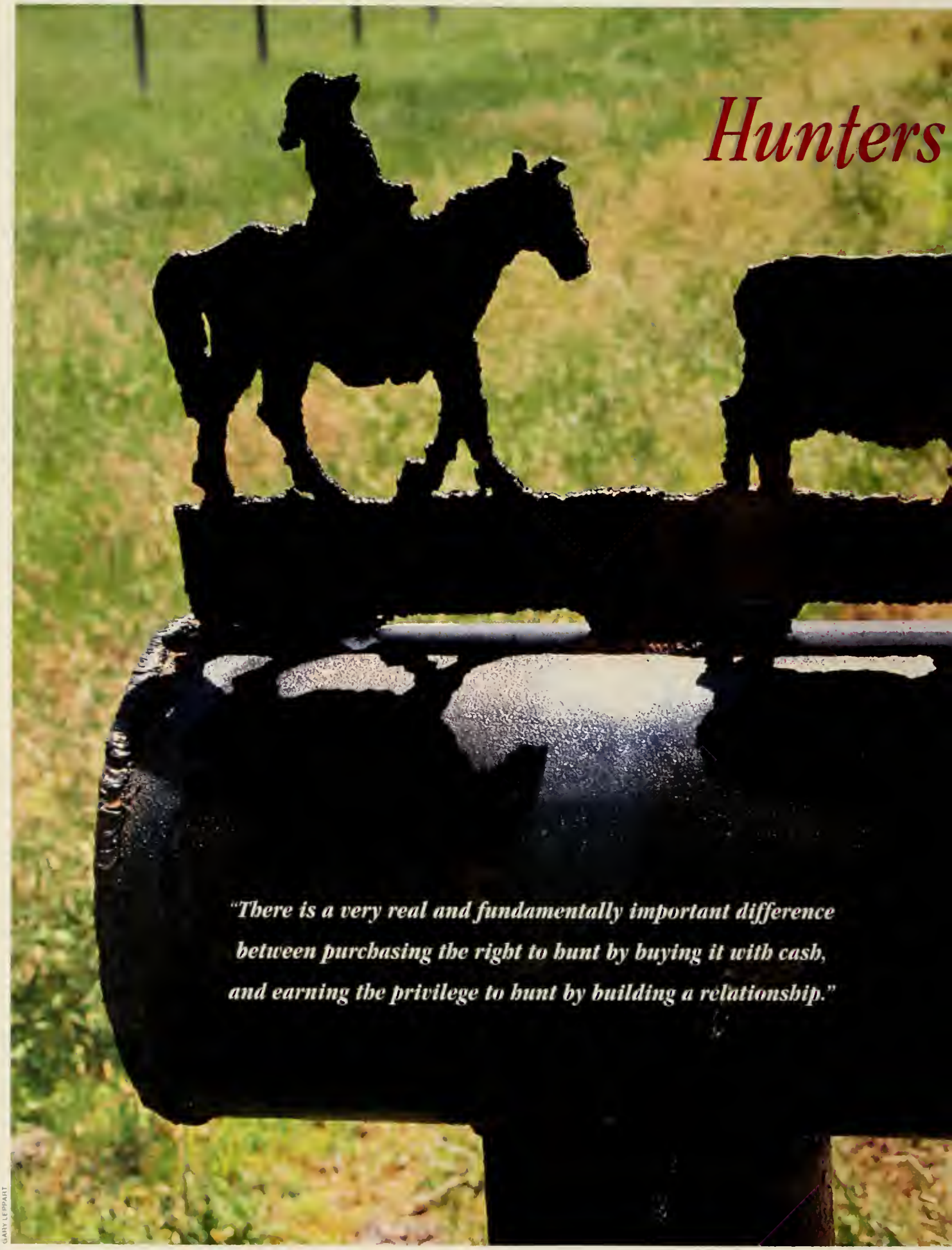
Mountain lion diets during winter reflected prey densities, with deer the primary prey species. They also killed elk and sheep occasionally; we estimated they killed four sheep per year on the WMA. Mountain lions and bighorn sheep use the same rugged habitats, and given the relatively high density of mountain lions on bighorn range in winter, predation on sheep appeared to be opportunistic. Losses of adult sheep from predation by mountain lions generally offset annual additions to the sheep population through recruitment.

During our study, the bighorn sheep population decreased despite the augmentation of 39 sheep in 1995 and 1996. One primary reason was the loss of transplants. Only 15 of the 39 transplanted sheep were alive and on the WMA at the conclusion of the study. Eleven sheep swam across the Missouri River to the Sleeping Giant Wilderness Area and another 13 died or disappeared. The second reason was that the remaining transplant ewes had low reproductive success, producing only 22 lambs in three years (these ewes had the potential to produce 78 lambs during the period had they all given birth to one lamb each year). Despite their relatively low productivity, transplant ewes were responsible for 50 percent of the cumulative lamb crop during the study and made an important contribution to the bighorn population.

Our findings are similar to those of other studies conducted on low-elevation bighorn sheep herds in Montana and Wyoming. We found that poor reproduction and disease continued to affect the Beartooth WMA population 15 years after the die-off. It is interesting to note that, in a region where winter is considered the critical season for ungulate survival, summer climate appeared to play an important role in regulating the performance of this sheep herd. Mountain lions preyed primarily on deer and elk, and predation had only a moderate influence on sheep population dynamics. Our data suggest that poor performance of this bighorn sheep population was not due to predation, even in a setting with relatively high mountain lion densities. Finally, augmentation failed to spur herd growth due to dispersal and poor reproductive success of transplants. We hope the insights and information obtained in this study will help FWP biologists develop effective management strategies for the Beartooth WMA bighorn herd in the future. ■

BEARTOOTH WILDLIFE MANAGEMENT AREA

I would like to thank several FWP employees for their support during this study, including Jim Williams, Graham Taylor, Keith Aune, and Glenn Erickson. The services of renowned mountain pilot Jim Lowe and houndsmen Gary and Scott Langford were invaluable. Field assistants Bob Michaelson and Terry Antonich helped to obtain data during the study. Members of the Devil's Kitchen group allowed access to private lands adjacent to the WMA. Finally, I want to express my gratitude to Dr. Harold Picton, my advisor at Montana State University who offered guidance, insight, wisdom, and humor along the way.—Terry Enk



Hunters

"There is a very real and fundamentally important difference between purchasing the right to hunt by buying it with cash, and earning the privilege to hunt by building a relationship."

GARY LEPPART

Say Thanks in Many Ways

by Alan Charles

Recently, I had a Miles City rancher show me several nicely framed outdoor prints hanging on his walls, a Dillon-area rancher show me a fancy cut-out metal ranch sign depicting a packstring of horses and the ranch name and brand, a central Montana farmer tell me about a decorative mailbox now standing in front of his house, and a landowner near White Sulphur Springs show me a freshly refurbished set of corrals and holding pens with new poles tacked up tight on all sides. What all four of these landowners had in common was that they were showing or telling me about gestures hunters had made to say thanks for past hunting trips, and I could tell that the gestures were really appreciated.

Hunters say thanks in many ways. Some simply send thank-you notes with Christmas cards, or write letters and enclose pictures of their hunts. A hand-written note, especially one written by a youngster telling about his or her first hunt, is sure to bring a smile to the face of the farmer or rancher who helped make it possible.

Other hunters say thanks by sharing the game they bag. Although many Montana landowners grow up on a steady diet of elk and venison, and may decline a hunter's offer of a skinned hindquarter or package of steaks, rarely will a gift of well-spiced summer sausage or package of homemade jerky not be appreci-

ated. Many landowners who have eaten plenty of big game over the years may not have often tasted upland birds like pheasants or Hungarian partridge, and a brace of carefully cleaned and plucked game birds, or a smoked goose or turkey, might prove to be a rare treat.

I think it's often the homemade gifts that speak loudest for hunters showing appreciation to someone who helped them have a good time afield. A lady hunter told me she had a tradition of thanking one of her favorite landowners with a variety of homemade Christmas cookies (that he didn't have to share with anyone). "While he enjoyed this gift," she told me, "the gift that really made his face light up was simply for me to recognize and appreciate the beauty of his ranch. To have someone else see what he saw and appreciate its magnificence seemed to be the gift he appreciated most."

Some hunters paint pictures of the ranch, or draw hunting scenes that capture the area's beauty. Sending a thank-you note along with a framed photograph of the ranch buildings, or a scene from the ranch that captures its beauty, helps reinforce the idea that the hunter appreciated the land he was invited to visit and use for his hunting trip.

Another useful thank-you gift with a long history in Montana is a hunter's offer to assist with ranch work. While this often translates into hunters coming out in the spring to help brand, string fence, or maybe buck bales, there are other ways to provide help. I know two hunters who noticed the paint was peeling badly on an elderly ranchwoman's house one year when they stopped to ask permission. The next spring, they spent four days scraping, priming, and painting the house. In doing so, they subtly established a tradition that (a) they were welcome to come hunt each fall, and (b) they would show up each spring to do some work. (Now that spring turkey hunting has become popular in that area, I notice that their spring work days often coincide with the spring turkey hunting season, complete with an automatic invite from the obliging landowner.)

Some hunters even go so far as to annotate on the permission slip that they are willing to spend X-number of days the following year helping with some kind of ranch chore. It's a nice gesture, whether the landowner ever calls or not, because it provides a name and phone number to the landowner if, indeed, help is ever needed.

Every person is skilled at something, and often hunters seize the opportunity to say thanks by providing some kind of service. I've seen electricians, plumbers, carpenters, and mechanics either take time out from hunting or return after the hunt to apply their skills around the farm or ranch. I've often seen merchants say thanks by leaving one of their products as a thank-you gift, including tool sets, tack such as bridles or reins, clothing, books, food—the list is endless.

Along that same line, many hunters purchase gift certificates for thank-you gifts. One thing I always try to do is shop locally when I hunt outside my home area, and get gift certificates from local cafes, stores, or businesses. Hunters who buy gift certificates from local businesses reinforce the importance of hunting to the local economy and subtly bring recognition to landowners who are responsible for hunters being in the area.

One hunter told me he always tries to watch the sales of 4-H animals at fair time, and makes a special effort to buy animals raised by children of farmers and ranchers who have invited him to hunt. In talking to hunters and landowners, I am continually amazed at how creative hunters are in trying to say thanks. Other ideas include:

• Taxidermy mounts of animals or fish; furniture made of antlers.

• Products from the hunter's home area, such as seafood, produce, jams and jellies, cheeses, etc.

• Invitations for vacation trips, like the Alaskan commercial fishermen who invited a Choteau landowner for an all-expense-paid week of salmon fishing in Alaska.

• Offers to support organizations and legislation important to the landowner.

• Items for ranch animals, such as the doghouse a hunter built for a landowner's favorite dog, and the "cat couch" another hunter gave a ranch lady.

• Pre-paid calling cards given to a family with children living out of state.

• Books and videotapes—especially

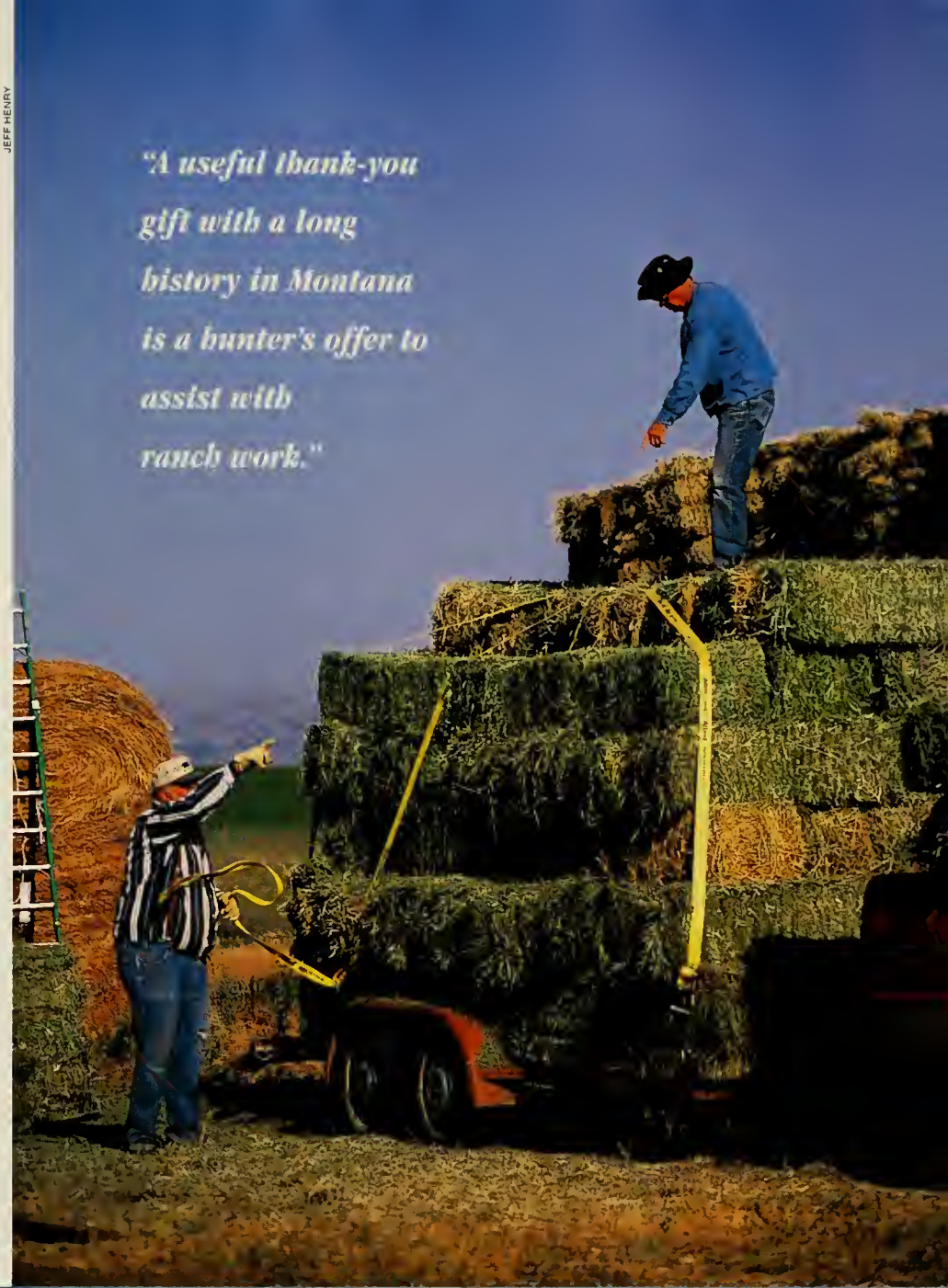
MIKE LOGAN

some of the cowboy humor items that poke fun and show appreciation for life in the country.

It's impossible to capture all the ideas, because there are as many ways to say thanks as there are people to conjure up ideas. As we struggle to preserve our tradition of landowners welcoming public hunters onto their property, I believe it is all the more important for hunters to make that special effort to say thanks, in whatever way seems appropriate, so that a positive landowner/hunter relationship can be maintained.

It is simple courtesy, but there is more to it than that. It is tradition, and it forms the backbone of good relationships between landowners and hunters in Montana. There is a very real and fundamentally important difference between purchasing the right to hunt by buying it with cash, and earning the privilege to hunt by building a relationship. Montana's long-standing tradition of private landowners sharing their lands with public hunters bears testimony to the importance of that annual ritual where hunters say thanks to their friends in the country—thanks for sharing your land and providing us a place where we can build another cherished memory of a Montana hunting trip. ■

JEFF HENRY



MIKE LOGAN

Unraveling Mule

by Dave Pac and Bernie Kuntz

"Here we go," said Roger Stradley as he banked the Piper Supercub to the left and cut the throttle with flaps to slow our speed. As we soared past a clump of subalpine fir trees only 40 feet below, Rog positioned the plane perfectly for us to see a swath of blood in the snow and the partially consumed carcass of a yearling buck mule deer tucked under the boughs. This was the thirty-second radio-collared deer we had located this cold winter morning, and we had 40 more radios to locate.

It had been 15 degrees below zero when we took off at dawn; now, in the full sun of late morning, the temperature had risen to -9. The windows were continually icing up from our breathing and our feet were cold even though we had on winter boots. The sky was cobalt blue and the Bridger Divide was so white with fresh powder that it momentarily blinded us when we looked up at the crest.

This was the only dead deer we found that December day in 1994 among our sample of radio-collared deer; the next day we would make the long hike in to investigate the cause of death. That morning's efforts were not unusual in that the seasonal movements and fates of hundreds of

Deer Mysteries

radio-collared deer were monitored in similar fashion by teams of Montana Fish, Wildlife & Parks (FWP) biologists and pilots who worked on a massive project called "Statewide Deer Studies." In many respects, the tens of thousands of aerial "fixes" of these deer were the most valuable data we collected.

It all began in the mid-1970s, when an unexpected decline in mule deer populations struck not only Montana but much of the western United States. Wildlife professionals in the old Montana Fish and Game Department responded by establishing mule deer population studies in the Bridger Mountains of southwestern Montana, in the Missouri River Breaks, and in the prairie-badlands along Cherry Creek in the southeastern part of the state.

The ensuing 25 years of research resulted in one of the most comprehensive studies of a big game species ever compiled in North America. The studies provided the foundation for a gradual change in the philosophy and science under which mule deer are managed in Montana. At the time these studies were begun, biologists believed mule deer populations functioned similarly in all regions of Montana. Now we know that each population adapts to its environment in a unique way.

Mule Deer Populations

Montana has a tremendous diversity of vegetation and topography, with mule deer habitats extending from rolling prairies at elevations of 2,500 feet to rugged mountains rising to nearly 13,000 feet. Some arid reaches of the state receive as little as six inches of annual rainfall, while the northwestern conifer forests receive more than 50 inches. Across these landscapes, deer adapt to changes in their environment on a daily, seasonal, and annual basis. Some of these changes are favorable to deer; others are not. Over long periods, environmental conditions that cause deer populations to expand are generally balanced by conditions that cause populations to decline. If quality habitat disappears or the environment fluctuates too widely, local populations will disappear. Likewise, new populations may gain a foothold when favorable conditions create opportunities for colonization.

GARY LEPPART

In all mule deer habitats, precipitation and temperature prior to and during the growing season affect the amount and quality of forage produced. In favorable years, when high-quality forage is plentiful throughout the prolonged, lush summer, deer accumulate a thick layer of body fat. Thanks to this "insurance policy," deer survival is usually high during the subsequent winter, even if conditions become severe.

During hot, dry summers, quality forage is scarce. Adult deer expend more energy than they gain and accumulate only a thin layer of fat; fawns may go into winter with no fat at all. If the winter is even moderately severe, survival will be low.

In the fog-shrouded forests of northwest Montana, where weather is moderated by the influence of the Pacific Ocean, environmental conditions are relatively stable from year to year. The swing from favorable to unfavorable conditions for deer is much less pronounced than on the prairies of eastern Montana, where the continental climate can result in dramatic changes in summer and winter conditions each year.

To increase the efficiency and responsiveness of mule deer management across the state, we have defined five environments, or population management units, based on differences in weather patterns, vegetation, topography, land use, and deer population characteristics: prairie/breaks, mountain foothills, prairie/mountain foothills, southern mountains, and northwest montane (see map on page 22). More than two decades ago FWP biologists undertook long-term studies in two of these environments—prairie/breaks and mountain foothills—to gather detailed information on how mule deer populations respond to weather, habitat changes, predation, and hunting.

DONALD M. JONES

Prairie/Breaks Studies

A 27-year study in a 100-square-mile area of the Missouri River Breaks showed that 60 percent of the mule deer in this region occupy the same home range throughout the year, while 40 percent move less than 6 miles between summer and winter home ranges. Deer density varies from 3 to 16 deer per square mile.

Where prairie/breaks are adjacent to agricultural land, higher densities (30 or more deer per square mile) can occur. Mule deer numbers in this area are capable of rebounding quickly from population declines. When conditions are favorable, deer numbers can double in two years. In such years does feed on high-quality forage while nursing their fawns, and adult deer and fawns enter winter with ample fat reserves. Due to an abundance of small mammals, coyote predation on deer is

and Habitat

PHIL FARNES

Mountain Foothills Studies

Another environment that has received intense scrutiny is the mountain foothills type, specifically the Bridger Mountains in southwestern Montana, where mule deer have been studied for 30 years. In the mountains, up to 90 percent of the mule deer migrate between distinct summer and winter home ranges. The average migration is about 8 miles, but some deer travel as far as 80 miles. Only 10 percent of the deer in the Bridger Mountains reside in the same home range throughout the year.

Density of adult deer on choice summer ranges in the Bridgers can be 25 or more per square mile. Less productive summer ranges support only a few deer per square mile. On winter ranges, densities vary from a low of 25 to a high of 85 deer per square mile. During severe conditions (deep snow and subzero temperatures), densities may be more than 150 deer per square mile for a month or more.

Prolonged snow cover and delayed plant growth in spring can keep mule deer "bottled up" on winter ranges. Long winters are particularly hard on fawns because they usually enter winter with limited fat reserves. Also, deer in mountain country face a greater variety and number of predators, including coyotes, lions, black bears, and bobcats. Some areas also include grizzly bears, colonizing wolves, and large numbers of free-ranging dogs.

An important characteristic of most deer populations in the mountains is relatively low fawn recruitment rates. On average in the Bridgers, only about 35 fawns per 100 adult does survive to their first birthday. In the best years, fawn survival may approach 43 percent, while in the worst years it may be as low as 3 percent. This means that mountain deer populations tend to recover more slowly from declines.

When conditions are favorable, harvesting up to 20 percent of the adult does may be necessary to stabilize increasing populations. During years when fawn survival is moderate, doe harvests of 10 to 15 percent will stabilize populations. When conditions are severe, natural loss of fawns and adults may cause the population to decline even without hunter harvest.

As is evident from these examples, mule deer occupy dynamic environments. However, the principles that guide deer management have been traditionally founded on concepts that minimize the importance of environmental variation. For management to be successful, we need improved population monitoring and more responsive harvest regulations.

"Deer in mountain country face a greater variety and number of predators, including coyotes...."

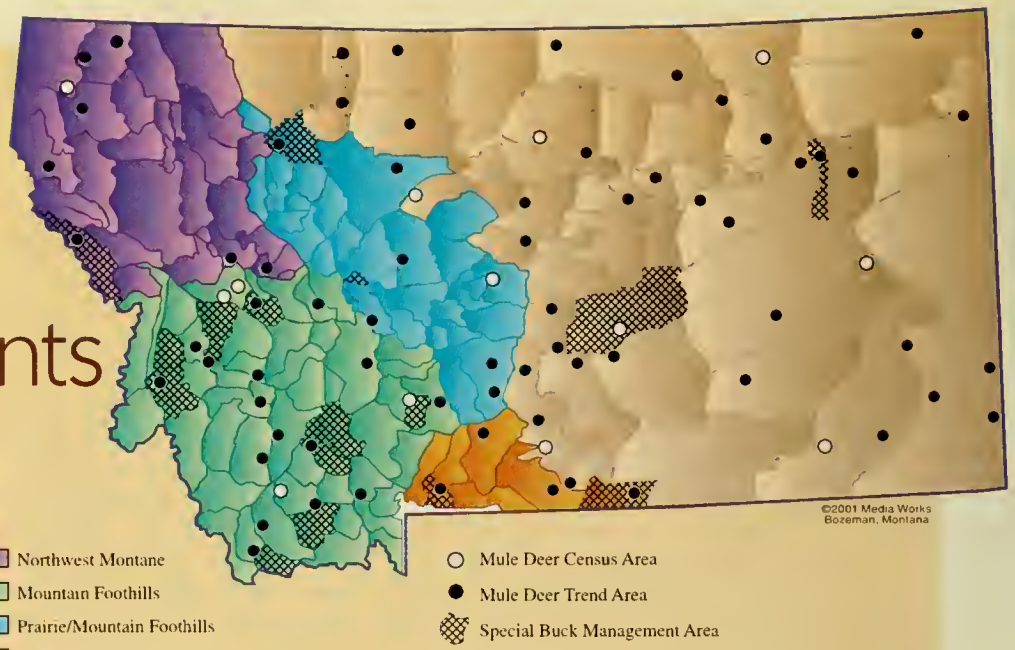
minimal. In the very best years, only 17 percent of all fawns die in their first year, and only 1 percent of adult does die.

When conditions are unfavorable, deer numbers also can decline by 50 percent or more in a single year. Fat reserves laid on in summer are inadequate to sustain the deer through a long, cold winter. Because small mammal populations often decline during dry summers, coyotes prey more heavily on deer. Under the most severe conditions, 95 percent of all fawns may die before their first birthday. These same conditions can cause mortality of up to 25 percent among adult does.

These dynamic population shifts reveal just how much fluctuation we can expect in deer numbers in the prairie/breaks environment, where extreme conditions occur in about 2 out of every 10 years. During the other 8 years, populations fluctuate more moderately.

Hunting, of course, is another form of mortality, and the only source that can be reliably controlled by management actions. Biologists use harvest of adult does as the primary means of influencing population trends. Under ideal conditions in the prairie/breaks environment, a harvest of up to one-third of the does is required to stabilize growth of the population. However, the situation can change within a year or two to a point where it may not be desirable to take any does at all. This is all predicated on managing a deer population toward a predetermined numerical goal that attempts to satisfy the needs of hunters and landowners.

Mule Deer Environments



Ecosystems in Montana vary tremendously, as does the potential for hunter harvest. To increase the efficiency and responsiveness of deer management across the state, we have defined the following five environments based on differences in weather patterns, vegetation, topography, land use, and deer population characteristics.

Prairie/Breaks (77,663 square miles)

Consisting of flat to rolling benchlands, ponderosa pine savannas, and rugged badlands or breaks adjacent to major rivers, this unit encompasses the eastern two-thirds of Montana. The semiarid climate is hot and dry in summer and cold and dry in winter; temperature and precipitation vary widely during all seasons. Mule deer populations fluctuate more here than in the mountains. Most of the land is privately owned and access for hunting varies.

Mountain Foothills (24,030 square miles)

Consisting of gently undulating foothills to steep mountain slopes, this unit includes terrain with elevations ranging from 4,000 to 11,000 feet. Topography and elevation cause variation in local climate and weather conditions. Deer inhabit shrub- and grass-covered foothills during winter, and higher elevation conifer forests and subalpine meadows in summer. Because winters are longer here than in other environments, deer must recover their physical condition, reproduce, and accumulate fat during a comparatively short growing season. Therefore, fawn survival rates tend to be lower than in other environments.

Prairie/Mountain Foothills (10,233 square miles)

This is a transition zone with characteristics of both the mountain foothills and prairie/breaks units. Topography varies from low, rolling hills to steep mountain canyons. Elevations range from less than 4,000 feet to over 9,000 feet near the Continental Divide. Precipitation ranges from 10 to 12 inches at lower sites to more than 40 inches in the mountains. Vegetation varies from prairie grasslands to forests and alpine meadows. During favorable conditions, fawn survival rates are nearly as high as those on the prairie. Severe winter weather or drought can occasionally lower survival rates to those typical of the mountain foothills.

Southern Mountains (4,266 square miles)

Topography in this south-central unit varies from rolling hills to sheer mountain canyons thousands of feet deep. Elevations range from 4,500 feet to nearly 13,000 feet. Annual precipitation varies from less than 6 inches to more than 40 inches in the mountains. Habitats include shrub deserts, montane forests with intermountain grasslands, and alpine plateaus. Many mule deer populations in this unit have shown minimal recovery since the declines of the mid-1970s.

Northwest Montane (14,659 square miles)

Topography varies from rugged, mountainous terrain along the Continental Divide (including the Flathead, Swan, and Mission ranges) to smaller ranges such as the Salish Mountains. Elevations vary from 2,000 feet in the northwestern portion of the unit to over 9,000 feet in the Mission Mountains. Climate is strongly influenced by moisture-laden air from the Pacific Ocean. Annual precipitation varies from 20 to 32 inches, with more than half falling as snow. Mule deer populations have generally declined in abundance and distribution over the last 50 years due to fire suppression and revegetation of old burns with conifers. Harvest data indicate that deer populations in this unit may fluctuate less than in other environments.

Adaptive Harvest Management

GARY LEPPART

In the mid-1990s, a cooperative effort between state, provincial, and federal wildlife agencies responsible for waterfowl management in North America created a harvest management plan for mallard ducks based on "adaptive management" concepts. In 1996, FWP began development of an Adaptive Harvest Management (AHM) program for mule deer. The FWP Commission officially adopted it in 1998.

What sets adaptive management concepts apart from more traditional approaches? The most important difference is recognizing there is still much we do not understand about the resources we manage, and that we need to redesign the management process in ways that identify these uncertainties and reveal new knowledge about wildlife populations.

Wildlife biologists can now approach deer harvest management not only as an ongoing experience, but more importantly as an organized experiment. That is what we have tried to create with the AHM process for mule deer in Montana.

The four basic components linked in this process are: (1) deer population goals and objectives, (2) deer population monitoring, (3) distinct sets of hunting regulations, and (4) computer models of population dynamics. Traditional management has always included some of these components, but AHM forces us to more clearly define goals and objectives and monitor the status of populations in relation to these goals. Each of these components needs to be looked at in more detail to explain how the new process works.

"In 1996, FWP began development of an Adaptive Harvest Management (AHM) program for mule deer."

DONALD M. JONES

"...we now can predict the degree of fluctuation for populations in various environments across the state."

Goals and Objectives

Deer population objectives are an integral part of AHM because they define direction and provide a way of measuring progress over time. Montana's mule deer management goal has been rewritten to recognize that these populations exist in changing environments, and that fluctuations in deer numbers can be expected. The goal states that FWP will "manage for the long-term welfare of Montana's deer resource and provide recreational opportunities that reflect the dynamic nature of deer populations."

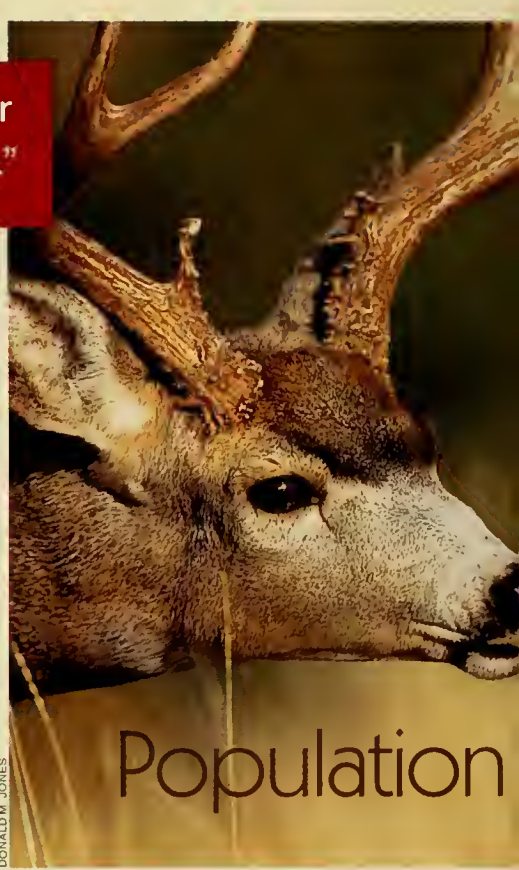
JEFF HENRY

Through radiotelemetry, FWP biologists are able to accurately estimate population size.

Thanks to the mule deer research described earlier, we now can predict the degree of fluctuation for populations in various environments across the state. With AHM, hunting regulations are tuned to the characteristics of these populations in an effort to minimize the steep declines that cause widespread concern among hunters and others. Also, timely changes in hunting regulations can help reduce peaks in deer numbers before they cause significant problems for landowners.

Mule deer population objectives are specific to each of the five major environments, or population management units. Included in these objectives are statements or pieces of information taken from the monitoring effort that describe the status of a number of representative deer populations. For example, the objective in the prairie/breaks unit—the state's most volatile environment—states that FWP will maintain the number of mule deer observed during spring on population survey areas within the range of 20 percent above and 30 percent below the long-term average.

Each year in the prairie/breaks, 42 different mule deer populations are monitored from aircraft to determine their status in relation to this goal. While the objectives acknowledge that these populations will continue to fluctuate, they challenge us to confine the peaks and valleys to a narrower range than has occurred in the past. We must have accurate information on the status of these populations each year to make responsive decisions. Some of these 42 populations have been monitored for 25 or more years, giving us a sound platform on which to base population goals.


DONALD M. JONES

Population

Monitoring the status of Montana's mule deer is a complicated endeavor. In the early days, biologists did not believe that deer could be accurately counted, although attempts were made from horseback or by driving back roads. In those days more effort was directed toward monitoring the trends of important forage plants to decide

JOHN LAMBING

Monitoring

if too many or too few deer were present on the winter range. While this approach provided useful information, it was not sensitive to the dynamic changes in deer numbers that can occur over short periods.

Advances in technology have changed all this. We are now able to conduct aerial surveys of mule deer in most environments. Through the use of radio-collars and radio-telemetry, we can determine the percentage of the population being counted during these surveys. This allows us to reliably estimate the number of deer in each population. Radiotelemetry also enables us to determine the seasonal movement patterns of deer populations.

During the last few years we have reorganized the monitoring program to increase the quality and consistency of the data collected throughout the state. We have standardized the kinds of data collected, the timing of surveys, and the types of aircraft (helicopter or Piper Supercub airplane). Two levels of survey intensity are included: trend areas and census areas. Essentially, trend areas and census areas provide a network of "warning lights" that can signal important changes in the size and composition of Montana's mule deer population.

Trend Areas.—Many mule deer habitats across Montana are in private ownership and support a variety of uses such as farming, ranching, timber production, or rural housing developments. Others are publicly owned and managed on a multiple-use basis. Sixty-seven "trend areas" reflecting this broad range of settings have been established across the state to provide consistent data on which to base local harvest strategies (see map on page 22). Each trend area is flown twice per year. The post-hunting season survey is flown between December 1 and January 15 to determine the proportion of bucks, does, and fawns at the onset of winter. The trend areas are flown again between March 15 and April 30, when deer are concentrated in open habitats during "green-up," to monitor changes in population size and determine the proportion of fawns surviving the winter.

Census Areas.—An additional 13 "census areas," which represent the most important environments occupied by mule deer, have been established for more detailed data collection. The primary difference between a census area and a trend area is that four aerial surveys per year are flown on each census area, compared with two for each trend area. A post-hunting season survey determines the proportion of bucks, does and fawns after the hunting season and before the onset of winter. Then, each census area is flown three times during spring green-up to give us a more accurate population count. These spring surveys also define the proportion of fawns (about to become yearlings) and adults in the population at the end of winter.

Our goals for the census areas are: (1) to provide data that can help us evaluate how well a hunting regulation worked and what changes in the population may unfold in the coming year; (2) to provide a statewide perspective of mule deer population trends based on rigorous methods of data collection; and (3) to establish a network of populations where various hunting regulations and harvest rates can be experimentally compared.

Hunting Regulations

DONALD M. JONES

Each of the five population management units has a "regulation package" tailored to the population's potential for hunter harvest. The intent is to achieve the proper harvest consistent with the current status of the population relative to the management objective. When a change in hunting regulations is warranted, the adjustment should be large enough to move the population in the desired direction. Each population management unit has a restrictive, standard, and liberal regulation package to provide an array of harvest rates.

For example, let's assume that 35 of the 42 population survey areas (trend and census) monitored in the prairie/breaks environment during a particular year indicate that deer numbers are as much as 25 percent above long-term averages. The fawn recruitment rate in spring for those same 35 populations varies from 65 to 75 fawns per 100 adults. These indicators describe populations that have expanded beyond the level defined in the population objective. A liberal hunting regulation that includes a high harvest of adult does is the appropriate recommendation for the coming year. In the prairie/breaks, "liberal" means a five-week, either-sex season with high numbers of antlerless licenses.

What about the other 7 of 42 populations in our example? Let's assume that only this portion of the vast prairie/breaks environment has experienced a local drought followed by a severe winter. Deer numbers are 30 to 40 percent below long-term averages and fawn recruitment varies from 10 to 20 fawns per 100 adults in spring. The appropriate recommendation would be a restrictive hunting regulation for these hunting districts. "Restrictive" is defined as five weeks for antlered bucks with no antlerless harvest. The AHM program allows for more than one regulation type within a population management unit in the same year.

Other population management units have restrictive, standard, and liberal seasons that produce harvest rates appropriate for the populations. For example, the liberal season in the mountain foothills unit calls for either-sex hunting for the first two weeks, antlered bucks-only hunting for the last three weeks, and moderate to high numbers of antlerless licenses. Although this "liberal" regulation produces a lower doe harvest rate than the one designed for the prairie/breaks, it is sufficient to stabilize population growth in this less volatile environment.

Even when a prescribed harvest rate is achieved, mule deer populations may not respond in a predictable or desired direction. This occurs because the environments occupied by mule deer are often severe and always variable. Uncertainty is a constant in deer management, and we still have much to learn.

Computer Models

"Uncertainty is a constant in deer management, and we still have much to learn."

MICHAEL H. FRANCIS

Recent advances in computer modeling have made it possible to more accurately predict how deer populations will react to changes in their environment. Using the data from long-term field studies, we have constructed population models for two major mule deer environments: mountains and prairies.

In using these models, we first enter data on population size and composition from post-hunting season and spring surveys on census areas. Next, we select the appropriate set of unfolding environmental conditions—such as droughty summers/severe winters or lush summers/mild winters. Finally, we select a restrictive, standard or liberal hunting regulation for the upcoming autumn. The model takes these data and activates mortality rates (determined from radio-collared deer in field studies) appropriate to the selected settings. The model then integrates these factors and projects the size and composition of the deer population one year into the future.

This capability gives biologists a valuable trouble-shooting tool. Let's say it is May 1, 2001, and the biologist has just completed the census area surveys in a nearby mountain range. Mule deer numbers in the population are close to the management objective and fawn survival over winter has been good, thanks to a dry, open winter. Liberal regulations have been in place for the last two years. He or she enters the survey data into the computer model and feels reasonably confident in selecting drought for the upcoming summer conditions. To continue the modeling exercise, a liberal hunting season is selected for next fall.

Of course, the next winter's conditions are impossible to predict. But what would the size and composition of this population look like next year (May 2002) if the upcoming winter were severe? Would the combined mortality from a dry summer, a liberal regulation, and a tough winter cause the population to decline significantly below the management objective? How would a mild winter change the outcome? Would a standard or restrictive season be more appropriate? The computer can quickly make projections based on these scenarios, thus helping with difficult management decisions.

This highlights the need for shortening the time between data collection, recommending a season, receiving public comment, and deciding on a final hunting regulation. When populations experience dramatic increases or decreases, this administrative loop needs to be compressed into a six-month time frame.

The beauty of this methodology comes from the feedback between modeling and monitoring that will occur each year. Model predictions will be compared with what the biologist actually observes a year later when he or she monitors populations on the census areas. Did the hunting regulation influence the population trend in the desired direction? Did the population respond to environmental conditions in the predicted manner? The knowledge gained can improve our understanding as we repeat the process year after year.

Over the years, we have learned that deer management functions in two different time frames. Long-term management requires continued protection and enhancement of the basic habitat components that ensure viable mule deer populations over large areas that can provide quality hunting. Conservation easements and other habitat protection initiatives address these important needs.

In the short term, we must recognize that populations can experience significant declines when conditions become unfavorable. This can occur even when the basic components of quality habitat are intact. When favorable conditions return, populations in high-quality habitat will recover. However, these short-term population fluctuations are of major importance to successful harvest management. We believe the Adaptive Harvest Management process will improve our ability to detect changes in the status of Montana's mule deer populations and allow us to respond more quickly with appropriate hunting regulations. ■

Catchall

Montana's Native Fish—Nature's Keepers

They're an odd bunch with old-time Hollywood names like Spoonhead, Stonecat, Cutthroat, Brassy, Redbelly, and Shovelnose.

But they're not film noir crooks. They're Montana's native fish.

As a group, all 56 of these often overlooked cast of characters still exist in Montana, but 18 are classified as Montana "Species of Special Concern" and three native fish—the threatened bull trout, and the endangered pallid sturgeon and white sturgeon—are protected under the federal Endangered Species Act.

Most of our best-known fish—rainbow trout, brown trout, largemouth bass, and walleye, for instance—are not native to Montana, but were introduced as sport fish by newcomers over the past 100 years or so.

"Montana's native fish adapted to life here over thousands of years," says Bob Snyder, FWP's enthusiastic native fish coordinator who's charged with helping FWP and all Montanans understand more about the state's seldom seen fish. "You have to admire their tenacity. They've carved out a life in Montana's streams by adapting to wild spring floods, summer's drought, and then those long and bitter-cold winters. They're survivors, and so far none have been cast off the island, which is a real testament to the people of Montana."

Still, as new settlers changed Montana's landscape, the cycle of life also changed for many of Montana's native fish. The eventual planned and unplanned introductions of non-native fish also added new competitive challenges to the natives' struggle to survive.

Snyder, meanwhile, is attempting to build Montana's first native fish management plan to shed more conservation light on native fish populations and their habitats. He said the best plan would define ways to:

- Monitor the distribution and abundance of native fish.
- Maintain or enhance native fish populations and habitats.
- Maintain, conserve and enhance native sport fish populations—cutthroat trout, bull trout, Arctic grayling, sauger, shovelnose sturgeon, and paddlefish—to continue to allow angling and to allow anglers to keep some of the fish they catch.
- Invite local communities, scientists and other state and federal agencies to offer their expertise and advice in the conservation of native fish populations and habitats.
- Balance everyday management of Montana's world class cold-water (trout) and warm-water (walleye, bass) fisheries with everyday native fish management.

"Montana is a big place with lots of different fishing opportunities," Snyder says, noting that of the 60 fish listed as official Montana-record catches, 30 are Montana natives. "We can have introduced smallmouth bass and native sauger in the upper Yellowstone River, just like we have introduced Hungarian partridge and native sharp-tailed grouse in some areas. What we need to do now is learn more about all our native fish and the places where they're found."

For Snyder, it's a bit like a treasure hunt. "These native fish are Montana's collective family heirlooms, passed down from generation to generation," he says. Our cutthroat trout are still as fine a trout today as when they were first described by Lewis and Clark, but we really have to help reconnect our cutthroat trout to their native ranges, and we can do it. I like to consider our native fish as Montana's own keepers, stored away with all the treasures that make Montana such a special place. They're all still here and it's up to all of us to keep it that way."

To help spur interest in Montana's native fish, FWP has produced "Montana Native" bumper stickers, lapel pins, and FWP's Internet-based Bull Trout Education and Identification Program at fwp.state.mt.us. This fall, a special "Fishes of Montana" CD, which will also be available on FWP's Web site, will be delivered to Montana teachers throughout the state. For more information on Montana's native fish, contact your nearest FWP office.—*Tom Palmer, Information Bureau Chief, Conservation Education Division*

Pronghorn Facts

How fast can antelope run?

Sources differ, but pronghorns have been clocked from 60 to 70 mph for up to three or four minutes, and at 30 mph for up to five miles before slowing.

What is unique about the pronghorn's horns?

Antelope have horns rather than antlers and their horns are unique because they are shed and re-grow each year. The horn has a permanent bony core covered by a fibrous, hair-like keratinous sheath.

What makes the pronghorn capable of such speed?

This species has a unique capability of taking in and using oxygen. Antelope consume three times the oxygen of animals similar in size and have an extra-large windpipe, huge lungs, and a large heart.

What is the history of the pronghorn?

The pronghorn is an ancient species dating back nearly 20 million years. It is the only survivor of a group of hoofed mammals that originated in North America and it is considered to be one of the few living links to the Ice Age. Native Americans hunted pronghorns 30,000 years ago.

What creatures share the pronghorn's family tree?

No other creatures in the world are related to the pronghorn.

What do pronghorns graze on?

Pronghorns can graze on almost any plant, even thorny cactus and noxious weeds. They prefer broad-leafed plants or forbs, sagebrush, and shrubs. If necessary, they can survive bitter cold or desert heat and go without water for days.

What is the one puzzling shortcoming of these hardy survivors?

Antelope seem to prefer to go under, not over, fences. Low wire or woven-wire fences can stop antelope in their tracks or they will run along them. In fact, the antelope's reluctance to jump has led man to believe they can't jump, and that perception really gets wildlife biologists going. Here's what a couple of FWP wildlife biologists say on the topic:

JOHN R. FORD

"I hear tell that antelope in Texas or somewhere in the South routinely jump fences," says Joel Peterson, wildlife manager in FWP's Bozeman office. "I don't know if that's a fact, but that's what I've heard. I have also observed antelope jump fences in Montana."

Peterson says while he's seen antelope in Montana jump, they usually don't. He wonders if learned behavior plays a part. "All I know is, they are certainly capable of it," he says.

Tom Litchfield, FWP's wildlife biologist in White Sulphur Springs, says, "It seems to be more psychological than physical...they simply didn't evolve having to jump. Though they can jump, they usually don't in Region 4. It's not a question of state boundaries, but of how many fences are in the area, for how long, and what type of fences the pronghorns have been exposed to. A few fences on a range may not be enough exposure to fences to get them to jump."

Litchfield believes that pronghorns that learn they *can* jump should have a survival advantage over those that won't. And, in time, there may be more "jumpers" in the population. He goes on to tell the story of a very tired pronghorn buck in the White Sulphur Springs area that he and a companion were chasing on foot. The antelope had a large ball of baling twine caught on one horn along with about 20 feet of barbed wire trailing from it. This antelope cleared a 48-inch barbed wire fence from a standstill. "Fortunately for the antelope," says Litchfield, "he jumped into an uncut alfalfa field where the trailing barbed wire provided enough drag that we could catch him and get the horn freed from the debris."

It might just take the antelope time. After all, Montana's prairies have been fenced over the course of only the past 100 to 150 years, while these creatures have been evolving over millions of years.

So what's the final word? Have you seen Montana antelope jump or not? Let us know.

E-mail your comments to dtipton@state.mt.us or mail them to Montana Fish, Wildlife & Parks, Conservation Education, Attn: Antelope Question, PO Box 200701, Helena, MT 59620-0701.—*Diane Tipton, Information Officer, Conservation Education Division*

2001 Montana Outdoors Index

The major items published in *Montana Outdoors* in 2001 are indexed below. Extra copies of 2001 issues are available at $3.50 each (includes postage). The following back issues are available at the same price:

1971—all issues, except March/April
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1973—all issues
1974—all issues
1975—all issues
1976—all issues
1977—all issues, including Special Yellowstone Issue
1978—all issues, including Special Parks Issue
1979—all issues
1980—all issues, including Special Hunting Issue
1981—1995 all issues
1996—all issues, except January/February and March/ April
1997—all issues
1998—all issues
1999—all issues
2000—all issues

To inquire about or order a back issue, write: Back Issues, *Montana Outdoors*, Montana Fish, Wildlife & Parks, 930 West Custer Avenue, P.O. Box 200701, Helena, MT 59620-0701.

Fish/Fishing/Water

The Impossible Lie—Sometimes it's the trout you fail to catch that leaves the most lasting memory (E. Donnall Thomas Jr., May/June).

Reaching Consensus—A new fisheries plan for Flathead Lake represents the coming together of two cultures (John Fraley and Rich Janssen, May/June).

Fishin' the City—Kids with fishing poles and bicycles are beating a path to urban fishing ponds around the state (Dave Hagengruber, May/June).

2000 Fish Records—Montana anglers set seven new fish records in 2000 (Dave Books, May/June).

Beaver Ponds and Trout—For anglers who like to explore new country, beaver ponds hold great possibilities (Charles F. Waterman, July/August).

The Golden Years of Trout Fishing—A trout fisherman reminisces about Dan Bailey, a man who loved helping others get started in the sport (Neil Cantwell, July/August).

Getting 'Em Hooked—Bitterroot Valley anglers have a plan for the future of trout conservation, and it involves kids (Larry Javorsky, July/August).

From the Field—River Etiquette in Dry Times—Following 12 simple rules can help floaters and anglers protect the resource during a hot, dry summer (Stan Bradshaw, July/August).

Catchall—Web Site Offers Training on Trout—The "Bull Trout Identification and Education Program" on FWP's Web site provides knowledge about trout habitat and ecology (John Fraley, September/October).

Catchall—Montana's Native Fish—Nature's Keepers—Montana's 56 native fish species have adapted to life here over thousands of years (Tom Palmer, November/December).

General

Special Photo Issue (January/February).

FWP's 2000 Annual Report—A summary of FWP goals and priorities, project highlights, and a budget breakdown (March/April).

Catchall—Jeff Hagener Takes the Helm at FWP—Governor Judy Martz appoints Jeff Hagener as FWP's twenty-second director (March/April).

Catchall—Outgoing Governor Racicot Praises Pat Graham—Governor Marc Racicot congratulates Patrick J. Graham on a successful tenure as FWP director (March/April).

Catchall—Three FWP Commissioners Leave Lasting Legacy—Charles Decker, Dave Simpson, and Stan Meyer complete their terms as FWP commissioners (Alan Charles, March/April).

Catchall—Cutthroat Trout Display Presented to State of Montana—FWP presents the State of Montana with a cutthroat trout display for use in the Capitol Complex (March/April).

Swinging for the Fences—The Montana Fish, Wildlife & Parks Foundation offers creative funding solutions for worthy conservation projects (Keith Highley, May/June).

It's Not Rocket Science—It's Harder—Wildlife fieldwork has gotten safer and more efficient, but the complexity of wildlife management hasn't changed (Bruce Auchly, May/June).

Our Point of View—Hunting and fishing are fundamental to the Montana way of life (M. Jeff Hagener, May/June).

Catchall—Three New FWP Commissioners Appointed—John Lane, Rich Lane, and Dan Walker are appointed to FWP Commission (May/June).

From the Field—The Backcountry—A game warden reminisces about the pleasures of wilderness patrols (Jim DeBoer, May/June).

Our State Parks: Celebrating Past and Future—Winners of the State Parks Poster Contest for fifth-grade students are announced (July/August).

Our Point of View—Drought and extreme fire conditions call for tolerance and understanding on the part of recreationists (M. Jeff Hagener, July/August).

Catchall—FWP Biologists Receive Touchstone Award—Gayle Joslin and Heidi Youmans are honored by the Wildlife Management Institute (July/August).

Catchall—Quinn Honored by Hunting Group—Bigfork-based game warden Mike Quinn receives the Shikar-Safari Club International's "Montana Wildlife Officer of the Year Award" for 2000 (July August).

The Montana Outdoors Challenge—

How good a hunter and angler are you? Take this quiz and see if you can come away with a prize (Thomas Baumeister and Dave Hagengruber, September/October).

Catchall—A Rogue Grizzly Inspired FWP's Popular Logo—When biologist Lloyd McDowell killed a marauding grizzly in 1942, he had no idea it would become an FWP symbol (September/October).

Catchall—Fort Peck: Treasure of the Plains—Fort Peck Lake offers an abundance of recreational opportunities (Todd Glaser, September/October).

From the Field—A Sun River Legend—Bruce Neal's career as FWP game warden and manager of the Sun River Game Range spanned 30 years (Bruce Auchly, November/December).

Our Point of View—Research aids biologists in understanding population dynamics of many species (M. Jeff Hagener, November/December).

Wildlife

Social Arrangements by Peck & Peck—Animals avoid anarchy by establishing a pecking order and communicating in subtle ways (Sam Curtis, March/April).

A Singular Bird—A year-round resident, the Townsend's solitaire faces the Montana winter with a song (Jerry Kustich, March/April).

FWP Centennial Inspires Waterfowl Stamp—A steamboat plying the Missouri River near Fort Benton forms the backdrop for Cliff Rossberg's painting of Canada geese (Tom Palmer, March/April).

From the Field—DNA Testing May Solve Old Wildlife Mystery—FWP biologists send tissue samples from Yellowstone elk to Arizona for genetic comparison (Tom Lemke, March April).

Frog with a Tail—Icy mountain streams in northwestern Montana harbor a strange little amphibian (John Fraley, March/April).

Montana's Flying Toads—Myths abound about the nighthawk, a high-flying bug catcher with a host of colorful names (Ellen Horowitz, May/June).

Animal Attire—The fur, feathers, scales, and skin that animals wear serve many purposes (Sam Curtis, July/August).

Montana Bighorns—Thanks to a restoration program that dates back more than 50 years, bighorn sheep are thriving under the Big Sky (Glenn L. Erickson, July/August).

Sap on Tap—Sapsuckers provide food for many species when they drill those parallel rows of holes in trees (Ellen Horowitz, July/August).

Survivor—As tough as it is beautiful, the ring-necked pheasant is more than a match for weather, predators, and hunters (Bruce Auchly, September/October).

From the Field—Auctioning for Wildlife—FWP game warden and auctioneer Mark Anderson has helped conservation organizations raise more than a million dollars for wildlife (Paul Vang, September/October).

Autumn Whitetails—A pictorial celebration of a secretive big game animal—the white-tailed deer (photography by Donald M. Jones, November/December).

Bighorns in the Big Belts—Research on the Beartooth Wildlife Management Area reveals new facts about bighorn sheep (Terry Enk and Harold Picton, November/December).

Unraveling Mule Deer Mysteries—Long-term studies have given biologists valuable insights into mule deer population dynamics (Dave Pac and Bernie Kuntz, November/December).

Catchall—Pronghorn Facts—Wildlife biologists share their knowledge about antelope behavior (Diane Tipton, November/December).

Game/Hunting

Turkey Trot—Helping out a first-time turkey hunter turns into a dog-toting footrace (Cheryl Fraser, March/April).

Profile of an Elk Hunter—According to a recent FWP survey, bagging an elk is only part of the hunting experience (Zoe King and Rob Brooks, March/April).

The Thirty-One-Year Ram—It took 31 years to draw a permit, but the Sun River bighorn was worth the wait (Doug Engelhardt, July/August).

A Clan of Many Faces—Montana's hunters come from a variety of backgrounds, but they share a passion for experiencing the outdoors (Alan Charles, September/October).

Making His Mark—Despite being born with Down's syndrome, young Charlie Stafford is becoming a skilled outdoorsman (John Fraley, September/October).

Thirty Days Hath September—If you like to fish, bird hunt, and bowhunt for elk, September can be the best of all times (E. Donnall Thomas Jr., September/October).

Our Point of View—The best hunters make a point of acknowledging landowner contributions (M. Jeff Hagener, September/October).

Hunters Say Thanks in Many Ways—Simple courtesy forges good relationships between landowners and hunters (Alan Charles, November/December).

MONTANA FISH, WILDLIFE & PARKS FOUNDATION

The Montana Fish, Wildlife & Parks Foundation raises funds to provide critical private support for FWP in its stewardship of the fish, wildlife, parks and recreational resources of Montana. The foundation accepts individual and corporate gifts and assists in designing planned gifts to fit individual needs. For more information visit the foundation web site at *http://fwp.state.mt.us/foundation* or e-mail at *fwpfoundation@state.mt.us.* You may also call or write

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A Sun River Legend

by Bruce Auchly
Information Officer
Region 4, Great Falls

Many people have worked for Montana Fish, Wildlife & Parks (FWP) during its 100 years of existence. Scoundrels and saviors, renegades and the righteous, and the just plain dedicated.

Put Bruce Neal in the last group.

Neal, who died in 1974 at age 89, had a career that spanned 30 years, starting in the mid-1920s with FWP, then known as Montana Fish and Game. He began as a game warden, and eventually became the first manager of the Sun River Game Range, spending his entire career along the Rocky Mountain Front west of Augusta.

"He was well read, intelligent, and dedicated, especially when it came to elk," recalls Bert Goodman, 73, who followed Neal as manager of the game range, now called the Sun River Wildlife Management Area (WMA).

Neal retired from the department in 1956. The handful of people still alive who worked with him are now in their 70's and 80's. Memories dim. Stories grow. Legends gain stature, something even Neal took pleasure in when he was the subject.

"He was a marvelous storyteller," Goodman says, "and he enjoyed fertilizing the stories that were spread about him. I thoroughly enjoyed him."

Today, thousands of people each year use the Sun River WMA. Yet except for some old-timers, relatives, and students of wildlife history, few have any idea of the role Neal played in putting together the WMA or his earlier efforts at helping the wildlife resource in the Sun River country.

Those efforts started with protecting and enhancing wildlife populations decimated by decades of market hunting.

"He had the philosophy of the old time law enforcement," Goodman says. "That is the elimination of predators, and law enforcement was the only tool you really needed."

That's because Neal worked in an era of preservation. A period—the 1920s and 1930s—when wildlife populations bottomed out from the subsistence hunting of the 1800s. Protection of game populations became essential. Eventually, preservation gave way to modern wildlife management beginning with the Federal Aid in Wildlife Restoration Act of 1937, also known as the Pittman-Robertson Act. Using earmarked P-R federal funds, Montana hired its first wildlife biologist in 1940, and wildlife management as a profession was born.

Times and thinking changed. Nowadays, the emphasis is on carrying capacities, healthy habitat, and managing predators as part of a balanced ecosystem. But that shouldn't diminish Neal's accomplishments.

Bruce Neal was born in 1884 in Pennsylvania. He came to Montana when he was 19 years old and got his start trapping wolves in the Missouri River Breaks. Three years later he ended up in the Sun River country, where he spent a lifetime outfitting, guiding, trapping, and working for the department. And having kids. Lots of them. Seventeen that survived to adulthood.

"He was a real mountain man," says Bob Cooney, "and I knew him well."

Cooney, now 92 and living comfortably in retirement, was the department's first wildlife biologist. Cooney remembers that besides enforcing fish and wildlife laws, one of Neal's more challenging tasks was dealing each winter with elk coming out of the mountains and onto private rangeland along the Front's windswept hills.

"The elk wanted to stay," Cooney says, "because the grass was tall and the forage was good."

At the beginning of the twentieth century, elk had been reduced to a few scattered herds along the Continental Divide. By the late 1920s, however, elk herds increased dramatically and began to reappear on their ancestral winter range along the Front. The problem was that native grassland had become livestock pastures and private hay meadows. When people tried to haze elk back into the mountains, chaos reigned.

"Horseback riders were shooting into the air," Cooney wrote in a 1979 magazine article. "Dogs were barking and elk were running pell-mell back toward the mountains. In fright they no longer jumped the fences but ran through them. Many were injured."

As the local game warden, Neal took on the job of herding elk. On foot, cross-country skis, and horseback, using a cowbell when necessary. Neal spent winter after winter pushing elk off private land. He got help from most ranchers and even his children.

"I remember going with him," says daughter Billie Pond of Augusta. "Dad was very protective of the elk, and he got along well with the ranchers."

Herding the elk meant keeping them a minimum of one night's migration inside the forest boundary. That translated to 6 to 10 miles back in the mountains.

"It was a difficult and far from pleasant task," Cooney wrote.

Finally in 1938, a rancher named Rathbone had had enough and adver-

First manager of the Sun River Game Range near Augusta, Bruce Neal devoted 30 years to conserving elk and other wildlife along the Rocky Mountain Front.

tised for machine-gunners to kill up to 1,000 elk on his land, "guaranteeing" them immunity from prosecution.

One elk was killed illegally and Rathbone went to trial. He was found guilty and appealed to the Montana Supreme Court. The court ruled that in severe game damage situations, when the state has exhausted its resources and the response is not effective, a landowner has the right to protect his property. But, the court added, "Montana is one of the few areas in the nation where wild game abounds. One who acquires property in Montana does so with notice and knowledge of the presence of wild game.... Accordingly, a property owner in this state must recognize the fact that there may be some injury to property or inconvenience from wild game for which there is no recourse."

The Rathbone case and Neal's continuing efforts each winter underscored the need for a place where elk could winter that wouldn't interfere with ranching concerns. Plus, some of the elk pushed back into the mountains were competing with bighorn sheep for winter range, and bighorn numbers were declining.

In late 1947, an Augusta area rancher had land for sale bordering the Lewis and Clark National Forest. Bob Cooney was in his Helena office when Neal telephoned with the news.

"It was some of the finest potential winter elk range in the entire area," Cooney remembered. But there was a catch. The owner knew the land was important to the elk and wanted to give the department the chance to buy it. However, Neal said, out-of-state cash was ready, and any state acquisition would take months. The owner couldn't wait.

A flurry of phone calls ensued, beginning with Tom Messelt, a Great Falls sportsman, who got in touch with Carl Malone, a Choteau rancher. Within an hour the men were able to come up with $10,000 for a down payment.

"We got back to Bruce. He was jubilant," Cooney said.

The new game range needed a manager, and the logical choice was Bruce Neal. So in 1948, Neal began the final chapter in his career with the Montana Fish and Game Department.

"He was the Sun River guy," says Merle Rognrud, one of the department's early wildlife biologists. "He was kind of a legend there."

Ever the outdoorsman, Neal preferred dealing with animals and people to paperwork. Rognrud recalls Neal's monthly reports: "'Herded elk. Fixed fence. Got supplies.' Always just two or three words."

Rognrud laughs, then sums up his recollection of Neal in a word used by all his colleagues: "Dedicated."

Bruce Neal's son, Chuck, who works for the federal Bureau of Land Management at Canyon Ferry Reservoir outside of Helena, has an idea where his dad's commitment started: "When he came into Montana," says the younger Neal. "I think he developed a real love of the wildlife. Not just for elk, but for all wildlife. I think the people who remember him can kind of remember the old man as fair. Fair to people and fair to the wildlife."

Readers Respond

Charlie Stafford Is a Hardworking Kid

What a great story about Charlie Stafford! John Fraley told us a story about a kid who likes to hunt and has worked hard to complete his hunter education certification and become an Assistant Hunter Education Instructor. The fact that Charlie has Down's Syndrome was mentioned only in passing.

Too often, news stories and articles about people with disabilities focus on the disability or have a tone of pity, focusing on the disability, not the person. Mr. Fraley's article did the exact opposite. My congratulations for giving readers a good story about a hardworking kid.—*Doug Doty, Helena*

P.S. Again, my congratulations for a great article. I have worked in Montana since 1984 with people with all kinds of disabilities. In the "disability community" we wince at the newspaper stories that take an "oh, the poor child/adult with disabilities" or "what a heroic struggle" tone. Mr. Fraley's article is absolutely the most "disability positive" story I have ever read from a Montana publication, including all the newspapers. I plan to share this article with special education teachers/newspapers to say, "This is how writing about people with disabilities should be done."

Editor's note.—John Fraley's article about Charlie Stafford prompted this letter to Charlie from Ray Hoven, a reader in Missouri. Charlie's response to Mr. Hoven follows the letter.

Dear Charlie,

I just received the September/October issue of *Montana Outdoors* and wanted to write to you immediately.

Congratulations on the deer you took last year! I'm even more impressed with your ability to rattle antlers.

I am 53 years old now and I have come to appreciate the true hunting of game—that is, everything a hunter does before he or she pulls the trigger. Of course, bagging the game is important, but to me everything else before that is the most fun! That's why rattling, grunting, tracking, and finding scrapes and rubs is so important.

You evidently are a true hunter and should be very proud!

We are so lucky to be able to hunt! I don't care how bad the weather is, it is just wonderful to be out in the woods and fields. I like fishing too, but not as much as hunting. Do you fish, also?

I've had some difficulty with my hips and legs and it is a little harder to get around now. I don't go up and down the hills like I used to but it's still great to be outdoors.

You may have noticed by now I'm writing from Missouri. Missouri is a great state for hunting and fishing and the change of seasons. But when a person thinks of hunting and/or fishing, I believe Montana is the place to be. One of these days I'm going to get to Montana!

You may also have noticed I'm a hunter education instructor in Missouri— we're in the same fraternity! Congratulations and thank you for your hunter education work. It's very important! I really believe in hunter education and carrying the word to the general public. In fact I have to get more active in hunter education—lately I haven't participated as much. Do you see how your story in *Montana Outdoors* has helped people? It has inspired me to work harder at my participation in hunter education.

Gosh Charlie, there is plenty more to say. Two hunters could sit and talk all day, but I'll end for now.

You should be very proud and it seems you have a wonderful family and I wish all of your family the best of things to come. Who knows, maybe we'll meet sometime.

Now I have to find out where to send this letter. It may go through several hands before it gets to you.

Congratulations again! Keep up the great work and do well in school.—*Ray Hoven, Wentzville, Missouri*

P.S. I've enclosed a few items I thought you would like or might find useful. The gray T-shirt is an XL but I hope you can wear it. You may have to grow into it, but it's the only size I had left.

The orange whistle also holds waterproof matches inside. I educate all of my students to carry one with them when they hunt.

Take care of yourself and have some good, safe hunting! Hey Charlie, what's the name of that good-looking dog you have? I have a yellow Lab and she is just a great dog. Her name is Sadie.

Dear Mr. Hoven,

Thank you for my T-shirt, hat, pens, whistle, and compass. I like your letter too. My dog's name is Zowie. She is a German shepherd. She is a great dog. I like being a hunter education instructor. I teach with my dad. I will add my new whistle and compass to my survival pack. Please let me know if you come to Kalispell, Montana. I would like to meet you.—*Your friend, Charlie Stafford*

We welcome your comments as well as letters to the editor. Please write us at: Readers Respond, Montana Outdoors, 930 West Custer Avenue, P.O. Box 200701, Helena, MT 59620-0701; fax 406-443-4619; e-mail montanaoutdoors@state.mt.us.

MONTANA OUTDOORS

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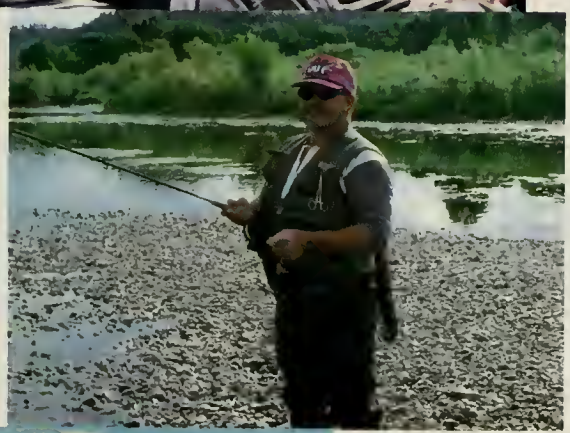

From top to bottom: Picton, Enk, Charles, Pac, Kuntz.

TERRY ENK AND HAROLD PICTON When he helped other biologists transplant 15 bighorn sheep to the Beartooth Wildlife Management Area in 1995, Terry Enk's job was just beginning. A doctoral student at Montana State University, he spent the next three years studying the bighorn herd and assessing the impacts of mountain lion predation (see page 9). He thanks his mentor and co-author, Dr. Harold Picton, for providing "guidance, insight, wisdom, and humor along the way." Enk now lives in Santa Fe, New Mexico, where he works as a wildlife consultant. He frequently returns to Montana to flyfish and teach courses at the Yellowstone Institute. Picton, a professor emeritus in wildlife biology at Montana State University in Bozeman, is currently completing a documentary on the history of wildlife management in Montana.

ALAN CHARLES Montana landowners have a long history of providing hospitality to hunters—a tradition increasingly threatened by changing economic times. "I believe it is all the more important today for hunters to make that special effort to say thanks," says Charles, "in whatever way seems appropriate." In his article beginning on page 14, he lists a number of thoughtful and innovative ways that hunters can say thanks, from a simple note of appreciation at Christmas to a gift or offer to help around the ranch. Charles is FWP's landowner/sportsman coordinator in Helena.

DAVE PAC AND BERNIE KUNTZ Mule deer are present all across Montana, and biologists used to think that mule deer populations functioned similarly in all parts of the state. "Now we know that each population adapts to its environment in a unique way," says long-time research biologist Dave Pac. He and FWP information officer Bernie Kuntz faced the daunting task of distilling 30 years of research into a single magazine article. For a comprehensive look at the status of the state's mule deer and a summary of "adaptive harvest management," FWP's current strategy for managing this popular big game animal, turn to "Unraveling Mule Deer Mysteries" beginning on page 18. Pac and Kuntz are based at FWP's Region 3 headquarters in Bozeman.

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